

LSC # 74
Action Approved
10-3-91

COVER SHEET: Request for Approval to Use W-Designation

TYPE I. PROFESSOR COMMITMENT

- (X) Professor Robert D. Soule Phone 3019
- (X) Writing Workshop? (If not at IUP, where? when? January 9-11, 1990)
- (X) Proposal for one W-course (see instructions below)
- (X) Agree to forward syllabi for subsequently offered W-courses?


TYPE II. DEPARTMENT COURSE


- () Department Contact Person _____ Phone _____
- () Course Number/Title _____
- () Statement concerning departmental responsibility
- () Proposal for this W-course (see instructions below)


TYPE III. SPECIFIC COURSE AND SPECIFIC PROFESSOR(S)


- () Professor(s) _____ Phone _____
- () Course Number/Title _____
- () Proposal for this W-course (see instructions below)

SIGNATURES:

Professor(s) 

Department Chairperson 

College Dean 

Director of Liberal Studies 

COMPONENTS OF A PROPOSAL FOR A WRITING-INTENSIVE COURSE:

- I. "Writing Summary"--one or two pages explaining how writing is used in the course. First, explain any distinctive characteristics of the content or students which would help the Liberal Studies Committee understand your summary. Second, list and explain the types of writing activities; be especially careful to explain (1) what each writing activity is intended to accomplish as well as the (2) amount of writing, (3) frequency and number of assignments, and (4) whether there are opportunities for revision. If the activity is to be graded, indicate (5) evaluation standards and (6) percentage contribution to the student's final grade.
- II. Copy of the course syllabus.
- III. Two or three samples of assignment sheets, instructions, or criteria concerning writing that are given to students. Limit: 4 pages. (Single copies of longer items, if essential to the proposal, may be submitted to be passed among LSC members and returned to you.)

Please number all pages. Provide one copy to Liberal Studies Committee.

REQUEST FOR APPROVAL TO USE W-DESIGNATION
VIA PROFESSOR COMMITMENT BY ROBERT D. SOULE
FOR SA 472: PROCESS SAFETY IN THE CHEMICAL INDUSTRY

I. WRITING SUMMARY

Characteristics of the Course and Students

SA 472, Process Safety in the Chemical Industry, is being proposed hereby as a writing-intensive course based on the commitment of the faculty member, Robert D. Soule, currently assigned to teach the course during Spring Semester, 1992. This course is one of several elective courses available to students majoring in safety sciences. Although typically two such elective courses are offered each semester, the number of elective courses available means that any particular course will be offered only once every two years.

Students taking this elective typically are upperclassmen, i.e., juniors or seniors with the majority of the required coursework in the major completed. The presumption is made that students enrolling in this course will have progressed far enough in the curriculum that they have been able to identify the chemical industry as a potential career path.

Types of Writing Activities Proposed

A minimum of eight different types of writing activities have been incorporated into this proposal. They have been formulated as a meaningful sequence of activities whereby the writing exercises will facilitate the learning process for students in the course. The description of this sequence, as it is proposed for presentation to the students, is provided in Section III as a sample of the assignments, instruction, and criteria given to students. The various writing activities are discussed in the following sections.

Free-Writing Exercises. At various times during the course, students will be asked to "take a few minutes" to express in writing the significance of a particular topic of current discussion. An example of this type of activity is described in Section III materials (Step 1 of the instructions for the Semester Project).

Maintenance of a Journal. Students will be required to maintain a journal of their activities and experiences during completion of the semester project. This is being done in an attempt to have the students analyze and express (in writing) their reactions to what is experienced in the classroom, at the library, in discussions with fellow students, and other situations where such experiences contribute to the completion of the overall semester project. There will be no "big deal" made of the mechanics of journal keeping; for example, legible handwriting will be acceptable. This

will be stressed to the students so that there will not be a tendency to "copy over" or otherwise edit the journal entries.

Library Exercises. Several minor exercises will require the students to become familiar with and use library resources. They will be required to locate a relevant article in the literature, correctly cite the reference using an appropriate style (see next section), and quote correctly and precisely from a literature source. Peer evaluation will be used to a limited extent here, in that the references will be exchanged among students and verification of each student's work will be provided by another.

Familiarization with Style Manuals. Students will be asked to select a particular style manual from among those in common use at IUP. They will be expected to adhere to the selected manual for all citations, references, and format of a formal paper prepared as a semester project.

Interview with an Expert. Students will be expected to incorporate results of an interview with a knowledgeable person into their semester project. This exercise will require the student to identify and explain/justify in writing their choice of person to interview. In addition, to facilitate the interview process, students will be required to prepare questions suitable for use during the interview. A written summary of the interview also will be prepared.

Formal Semester Paper. The culmination of the semester project will be a formal paper, based on the sequence of writing activities outlined above. Preliminary steps will include selection and justification of the topic, preparation of a detailed outline, submittal of a draft (optional), and the final paper. Students will be encouraged to submit a draft which will be reviewed by the instructor and returned to the student to allow revision of the paper.

Of the various writing activities described above, only the final, formal paper will be used as an item of evaluation for purposes of determining a grade for the course. A table summarizing the type, objective, amount of writing, number and frequency of assignments, revision opportunities, whether the activity is to be graded, and percent contribution of graded activities is presented below.

TYPE	OBJECT	AMOUNT	NO/FREQ	REVISION	GRADED	PERCENT
Free	see disc'n	1 page	4/semester	no	no	NA
Journal	see disc'n	10 pages	continuous	no	no	NA
Library	see disc'n	2 pages	3/semester	no	no	NA
Style	see disc'n	2 pages	2/semester	no	no	NA
Interview	see disc'n	5 pages	1/semester	no	no	NA
Paper	see disc'n	15 pages	1/semester	yes	yes	25%
Quizzes	essay	1 page	6/semester	no	yes	25%

II. COURSE SYLLABUS

OBJECTIVE:

The objective of this course is to prepare the safety professional so that s/he may be able to work effectively with chemists and chemical engineers in joint efforts to recognize, evaluate and control hazards in the chemical industries.

REFERENCE BOOKS:

01. Chemical Process Safety: Fundamentals with Applications, Daniel A. Crowl & Joseph F. Louvar; Prentice Hall; Englewood Cliffs, NJ (1990).
02. Safety and Accident Prevention in Chemical Operations, Howard H. Fawcett & William S. Wood; John Wiley & Sons; New York, NY (1982).
03. Selected Readings in Chemical Process Safety, from various recent publications; [distributed in class].

CLASS SCHEDULE:

<u>Date</u>	<u>Topic</u>	<u>Assigned Readings</u>
Jan 27	Introduction; Overview of Chemical Process Industries/Material Properties	C&L: Chapt 1 F&W: Chapt 1, 4, 5
Feb 03	Unit Operations I: Heat Transfer; Fluid Flow; Mechanical Separation	[hand-outs]
Feb 10	Unit Operations II: Distillation; Extraction; Absorption; Adsorption	[hand-outs]
Feb 17	Unit Operations III: Evaporation; Crystallization; Drying	[hand-outs]
Feb 24	Testing Materials for Hazardous Properties	C&L: Chapt 2, 3, 6 F&W: Chapt 14-18
Mar 02	Reaction Kinetics; Review of Common Industrial Chemical Processes	[hand-outs]
Mar 09	Semester Break	
Mar 16	Fire and Explosion Hazard Potential; Safety Design of Chemical Equipment	C&L: Chapt 7-9 F&W: Chapt 7-8, 19-23
Mar 23	Process Control; Concept of Process Review Team	F&W: Chapt 3, 6
Mar 30	Mid-Semester Exam; Case Studies	C&L: Chapt 12-13
Apr 06	More Case Studies;	[hand-outs]
Apr 13	System Safety Analysis; Hazard and Operability (HAZOP) Studies	C&L: Chapt 4-5, 10-11 F&W: Chapt 32, 35-36
Apr 21*	Process Safety Administration	
Apr 27	Regulations Pertaining Specifically to the Chemical Industries	[hand-outs]
May 04	Review of Current Apparent Trends in the Chemical Industries	F&W: Chapt 24 [hand-outs]

* = Tuesday

EVALUATION:

Your grade in SA 472 will be determined on the basis of your performance as measured by several separate, but related, means. A minimum of six (6) quizzes will be given during the semester. Several homework assignments will be graded. A project culminating in a formal paper will be prepared. Comprehensive mid-semester and final examinations will be administered.

All quizzes and examinations will be closed-book and will be announced at least one week in advance. An opportunity will be provided during the last week of classes for students to make up quizzes missed because of excused absences; it is the responsibility of the student to make arrangements for making up missed quizzes.

Homework assignments will be handed out during regular lecture sessions and will be due (typically) the following week. Homework will not be accepted after the due date unless prior approval has been granted.

The course project will consist of a sequence of related tasks, culminating in preparation of a formal "term paper". Details of the project are being distributed in a separate hand-out.

The weighting of the evaluation factors described above will be as follows:

<u>Item</u>	<u>Weight</u>
Quizzes	25%
Homework	10%
Mid-Semester Exam	20%
Project	25%
Final Exam	<u>20%</u>
	100%

CONSULTATION:

My office is located in the Safety Sciences Department, Room 116 Johnson Hall, where I can be reached by telephone at (412) 357-3019. I will maintain regular office hours at this location from 8:00 a.m. - 11:00 a.m., Monday through Friday. In addition, I will attempt to be available in my office in Johnson Hall during the hour preceding class each week. If you specifically want to discuss anything with me at that time, please call to make an appointment. If it is not possible for you to meet during any of these regular office hours, contact the department secretary to arrange an appointment during a mutually agreeable time.

III. SAMPLES OF ASSIGNMENTS/INSTRUCTIONS

Each student in SA 472 is expected to complete all of the assignments comprising the semester activities described below. If any of the assignments identified are not completed, the student will receive a grade of "I" (incomplete) for the course. Although all of the items discussed below are to be submitted to the instructor, only the final, formal paper will be graded. All other assignments will be reviewed by the instructor primarily for purposes of assuring the student that satisfactory progress is being made in the course.

SELECTION OF TOPIC FOR FORMAL PAPER

1. During the first meeting of the class, all students will be asked to identify a minimum of three (3) aspects of the course subject area (chemical process safety) which interest them.
2. Each student must maintain a journal, in diary format and narrative style, of all activity pertaining to completion of the formal paper. Journal entries should be written as if spoken, or otherwise related, to a fellow professional (or professional-in-training), presumed to have knowledge of the subject matter equivalent to that of the writer. Concepts, considerations, accomplishments, frustrations, and all other feelings associated with work on the project should be entered into the journal. Journals will be collected at least twice during the semester for review and comment by the instructor.
3. Prior to the third meeting of the class (February 10) a copy of an article pertaining to some aspect of chemical process safety must be submitted to the instructor along with the following:
 - a. specification of a style manual which the student has selected to define format, citation methods, referencing style, and other criteria for presentation of the formal paper (at least six different style manuals are in common use at IUP),
 - b. a 5" x 8" card on which the student has identified the source from which the article was obtained, using the correct and complete citation for doing so, as specified in the style manual identified above,
 - c. on the 5" x 8" card mentioned above, an exact quotation from the reference, one which the student considers to be significant, and
 - d. a list of five (5) questions which are raised by the article; these may be questions concerning methodology, issues pertaining to the central theme, suggestions for additional work, or any other relevant questions.
4. During the fourth class meeting (February 17), the 5" x 8" cards will be distributed among students in the class (no student will have his/her own card). Each student must verify the correctness of the citation on the card and, as evidence of having located the correct article, quote exactly the sentence in the article immediately following the one provided.
5. On the basis of the above input, a minimum of two suggested topics for the formal paper will be developed by the instructor; the student must select one of these topics, or suggest a comparable alternative, prior to the sixth class meeting (March 2).

OBTAINING MATERIAL FOR THE FORMAL PAPER

6. Prior to the eighth class meeting (March 23), the student must submit a one-page document which
 - a. identifies a resource person, i.e, someone whom the student believes knows more about the topic than s/he does, along with his/her affiliation,
 - b. explains why the student believes this person would be of assistance in preparing the paper on the topic selected, and
 - c. lists a minimum of five (5) questions pertaining to the topic, suitable for discussion during an interview.
7. Prior to the tenth meeting of the class (April 6), each student is to submit a brief summary (no more than two pages) of the interview with the resource person identified previously.
8. On at least two occasions during development of the paper, students will be asked to submit to the instructor all preliminary work obtained and/or accomplished to date. This will include all reference notes, bibliographic data, initial ideas on organization, preliminary outlines, and similar materials. It is expected to be "rough" in nature, but indicative of the effort expended.

PREPARATION/REVISION OF FORMAL PAPER

9. Prior to the twelfth class meeting (April 21) the student must submit a detailed outline of the formal paper. This outline, likely to be two or more pages in length, should be comprehensive enough that a full understanding of the thrust of the formal paper can be obtained.
10. The student may, but is not obligated to, submit a draft of his/her paper at any time prior to the twelfth class meeting (April 21). The instructor will review it, making whatever critical comment is appropriate, and return it to the student for revision as necessary.
11. The formal paper, in final form, must be submitted no later than the fourteenth (last) meeting of the class (May 4). Overall length of the paper is anticipated to be 12 - 15 pages, exclusive of any tables, figures, and references.

If, at the time of identification of a topic for the term project, you have not been able to select one that is appropriate, I will provide you with a description of a specific chemical process for which the following tasks are assigned. The project hypothesizes that you are the Safety & Health Manager on the corporate staff of a large chemical company. This company is planning to build a new processing plant identical to one described in the materials distributed to you. This new plant will be the first of its type to reach commercial production stage. All information available to you comes from pilot plant work conducted over the past several years. You have the task of conducting a preliminary review of this new facility and presenting your findings to a Process Review Board consisting of senior engineering and technical personnel. The Board will decide if the process design is adequate from the standpoint(s) of safety, health, fire protection, and environmental impact.

The report to the Process Review Board must be prepared carefully and presented properly. It is to consist of the following sections:

1. a one-page letter of transmittal addressed to the Board presenting the report and summarizing the overall assessment,
2. a summary table including the Dow Fire & Explosion Indices for each unit in the process (worksheets for each unit must be appended to the report),
3. a preliminary hazard assessment (PHA) of the unit with the highest index; this section must include the following, presented in management terms:
 - a. description of the "system"
 - b. description of your analysis
 - c. based on the PHA, identification of all credible and potentially catastrophic events which could occur during system operation (in tabular format) and specification where fault tree analyses should be performed, designating the "most undesired event" in each case
 - d. system definition and matrix sheets appended to the report
4. identification of all process safety devices which will be needed on each unit,
5. assessment of the health hazard, to include:
 - a. identification of the most toxic major components of the principal process streams,
 - b. quantification of the toxicity to the extent that data are readily available,

- c. description of the minimum testing required to assure safe handling of process streams where available data are not sufficient, and
 - d. discussion of minimum personal protective equipment requirements.
6. depiction in diagram form of the process units and the "hazardous locations", as defined by the National Electrical Code, that would require special electrical systems,
 7. determination of hazardous materials storage requirements; specification of the type of storage vessel(s) that would be most appropriate from a safety standpoint,
 8. a site study to include requirements, where appropriate, for and arrangement of units on the property, taking into account prevailing wind direction and any other relevant factors,
 9. definition and description of specific potential plant effluent problems, i.e., air, water, and soil pollution, and a strategy for appropriate control,
 10. a listing of those situations for which emergency procedures will be needed. These are to be developed before the plant becomes operation, but are only to be listed in this report; refer to the PHA to identify hazardous eventualities, and
 11. a listing of fixed fire suppression systems that will be needed in each unit and a justification for each.

A maximum use of tables, charts, maps, and diagrams is expected so as to make this information clear to the Process Review Board. Appropriate referencing, including consistent use of the previously selected style, is expected.